Ultrahigh Performance Staggered Lineup ("Type II") InP/GaAsSb/InP NpN DHBTs

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Abstract

Using a conventional emitter-up triple-mesa process, we have fabricated C-doped InP/GaAsSb/InP double heterojunction bipolar transistors (DHBTs) exhibiting both f_T and f_{MAX} = 300 GHz while maintaining a breakdown voltage BV_{CEO} = 6 V. Our devices feature stable and well-behaved common-emitter DC and RF characteristics up to J_C = 500 kA/cm^2 without any passivation nor heatsinking. InP/GaAsSb/InP abrupt junction DHBTs couple unprecedented performance to apparent manufacturablity advantages which should enable applications well beyond 40 Gb/s and challenge InP HEMTs in the 80-100 Gb/s arena.